

IN THE CLAIMS:

Please amend the claims as set forth below. This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-13 (Canceled).

Claim 14 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate, so as to form a substrate modified region due to multiphoton absorption at least only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and causing the substrate modified region to form~~ forming a starting point region for cutting the object inside the object by at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 15 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at

the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region including a crack region ~~at least~~ only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face,~~ and causing the substrate modified region ~~to form~~ forming a starting point region for cutting the object inside the object by at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 16 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region including a molten processed region ~~at least~~ only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face,~~ and causing the substrate modified region ~~to form~~ forming a starting point region for cutting the object inside the object by at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 17 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 ns or less, so as to form a substrate modified region including a refractive index change region which is a region with a changed refractive index ~~at least~~ only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and causing the substrate~~ modified region ~~to form~~ forming a starting point region for cutting the object inside the object at by a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 18 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate, so as to form a substrate modified region ~~at least~~ only within the substrate,

~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and causing the substrate modified region to form forming a starting point region for cutting the object inside the object by at a predetermined distance from the a laser light incident face of the object; and~~

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 19 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point within the substrate, irradiating the object with laser light while positioning a light-converging point within the laminate part, so as to form ~~respective modified regions to form~~ a substrate modified region only within the substrate and a laminate part modified region within the laminate part, each of the substrate modified region and the laminate part modified region forming a starting point region for cutting the object inside the object by at a predetermined distance from a laser light incident face of the object ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face; object; and~~

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from ~~the~~ each starting point region ~~for cutting~~ reaches a front face and a rear face of the object;

wherein the substrate modified region formed only within the substrate and the lamine
part modified region formed within the laminate part are separated separate from each other.

Claim 20 (Canceled).

Claim 21 (Currently Amended): A laser processing method according to one of claims 18-19, wherein the substrate modified region includes at least one of a crack region which is a region where a crack is generated within the substrate, a molten processed region which is a region subjected to melting within the substrate, and a refractive index change region which is a region with a changed refractive index within the substrate.

Claim 22 (Previously Presented): A laser processing method according to one of claims 14-19, wherein the laser light irradiating the substrate while positioning the light-converging point therewithin irradiates the substrate from the rear face thereof.

Claim 23 (Currently Amended): A laser processing method comprising the steps of:
irradiating a substrate with laser light while positioning a light-converging point within the substrate, so as to form a modified region ~~due to multiphoton absorption~~ only within the substrate ~~neither melting on a laser light incident face of the substrate nor forming a groove due to melting on the laser light incident face, and causing~~ substrate, the modified region to ~~form~~ forming a starting point region for cutting the substrate inside the substrate by at a predetermined distance from ~~the a~~ laser light incident face of the substrate; and

providing a ~~front face of the substrate with~~ a laminate part on a front face of the substrate after the step of forming the starting point region ~~for cutting~~; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face of the laminate part and a rear face of the substrate.

Claim 24 (Currently Amended): A laser processing method comprising the steps of:
irradiating an object to be processed comprising a substrate which is made of a semiconductor material and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least with the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region ~~at least only~~ within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and causing the~~ substrate modified region ~~to form~~ forming a starting point region for cutting the object inside the object by at a predetermined distance from the a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 25 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate which is made of a piezoelectric material and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region at least only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and causing the~~ substrate modified region to ~~form~~ forming a starting point region for cutting the object inside the object by at a predetermined distance from the a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 26 (Currently Amended): A laser processing method comprising the steps of:

irradiating an object to be processed comprising a substrate which is made of a semiconductor material and a laminate part disposed on a front face of the substrate with laser light while positioning a light-converging point at least within the substrate, so as to form a substrate modified region including a molten processed region at least only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, and causing the~~ substrate modified ~~molten-processed~~ region to ~~form~~ forming a starting point region for cutting the object inside the object by at a predetermined distance from the a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object.

Claim 27 (Currently Amended): A laser processing method according to one of claims 14 to 19, wherein the substrate modified region is formed within the substrate such that the substrate modified region shifts from the center position of the object in the thickness direction toward a rear face of the substrate.

Claim 28 (Previously Presented): A laser processing method according to claim 27, further comprising the step of applying stress to the object from the laminate part side after the step of forming the starting point region for cutting, so as to cut the object along the line.

Claim 29 (Currently Amended): A laser processing method according to one of claims 14 to 19, wherein the substrate modified region is formed within the substrate such that the modified region shifts from the center position of the object in the thickness direction toward the front face of the substrate.

Claim 30 (Previously Presented): A laser processing method according to claim 29, further comprising the step of applying stress to the object from the opposite side of the laminate part after the step of forming the starting point region for cutting, so as to cut the object along the line.

Claim 31 (Previously Presented): A laser processing method according to claim 19, wherein the substrate and the laminate part are a plurality of substrates formed while abutting.

Claim 32 (Previously Presented): A laser processing method according to claim 19, wherein the substrate and the laminate part are a plurality of substrates attached to each other while forming a gap therebetween.

Claim 33 (Previously Presented): A laser processing method according to claim 19, wherein the modified regions formed within the substrate and the laminate part overlap with each other along the line, when viewed from the thickness direction of the object.

Claim 34 (Previously Presented): A laser processing method according to one of claims 14 to 19, wherein the object comprises the substrate and the laminate part, the laminate part includes a first laminate part which is an oxide film disposed on the front face of the substrate and a second laminate part disposed on a front face of the first laminate part.

Claim 35 (Previously Presented): A laser processing method according to one of claims 14 to 19, wherein the object comprises the substrate which is a glass substrate and the laminate part which is a glass substrate.

Claim 36 (Previously Presented): A laser processing method according to one of claims 14 to 19, wherein the object comprises the substrate and the laminate part which is a laminated functional film.

Claim 37 (Previously Presented): A laser processing method according to one of claims 14 to 19, further comprising the step of cutting the object along the line from the starting point region for cutting.

Claim 38 (Previously Presented): A laser processing method according to one of claims 24 to 26, further comprising the step of cutting the object along the line from the starting point region for cutting.

Claim 39 (Currently Amended): A laser processing method comprising the steps of:
providing a front face of a substrate with a laminate part, the substrate having a starting point region for cutting formed only within the substrate, the starting point region for cutting formed by a substrate modified region formed at a position of a light-converging point in irradiation of laser light; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face of the laminate part and a rear face of the substrate.

Claim 40 (Canceled).

Claim 41 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least within the substrate, so as to form a substrate modified region due to multiphoton absorption at least only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face~~, with the substrate modified region forming a starting point region for cutting the object, the substrate modified region being located inside the object ~~by~~ at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 42 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at

least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region including a crack region ~~at least~~ only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, with the~~ substrate modified region forming a starting point region for cutting the object, the substrate modified region being located inside the object by at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 43 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region including a molten processed region ~~at least~~ only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, with the~~ substrate modified region forming a starting point region for cutting the object, the substrate modified region being located inside the object by at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 44 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least within the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 ns or less, so as to form a substrate modified region including a refractive index change region which is a region with a changed refractive index at least only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face,~~ with the modified region forming a starting point region for cutting the object, the substrate modified region forming a starting point region for cutting the object, the substrate modified region being located inside the object by a predetermined distance from the a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 45 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least within the substrate, so as to form a substrate modified region at least only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, with the~~ substrate modified region forming a starting point region for cutting the object, the substrate modified region being located inside the object ~~by~~ at a predetermined distance from ~~the~~ a laser light incident face of the object; and cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 46 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point within the substrate, irradiating the object with laser light while positioning a light-converging point within the laminate part, so as to form respective a substrate modified region only within the substrate and a laminate part modified region within the laminate part,

~~each of the substrate modified regions to form region and the laminate part modified region forming a starting point region for cutting the object located inside the object by at a predetermined distance from a laser light incident face of the object neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face; and~~

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device;

wherein the substrate modified region formed only within the substrate and the laminate part modified region formed within the laminate part are separated separate from each other.

Claim 47 (Canceled).

Claim 48 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating a substrate, the substrate ~~comprising semiconductor material and having a surface formed with at least one semiconductor device~~, with laser light while positioning a light-converging point within the substrate, so as to form a substrate modified region due to multiphoton absorption only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face~~, and with the modified region forming a starting point region for cutting the substrate, the modified region

being located only inside the substrate ~~by~~ at a predetermined distance from a laser light incident face of the substrate;

~~providing a front face of the substrate with a laminate part on a front face of the substrate after the step of forming the starting point region for cutting; and~~

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face of the laminate part and a rear face of the substrate in order to provide at least one manufactured semiconductor device.

Claim 49 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least with the substrate under a condition with a peak power density of at least 1×10^8 (W/cm²) at the light-converging point and a pulse width of 1 μ s or less, so as to form a substrate modified region ~~at least~~ only within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face, with the~~ substrate modified region forming a starting point region for cutting the object, the substrate modified region being located inside the object ~~by~~ at a predetermined distance from ~~the~~ a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 50 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

irradiating an object to be processed comprising a substrate and a laminate part disposed on a front face of the substrate, the substrate ~~comprising semiconductor material~~ and the laminate part having at least one semiconductor device, with laser light while positioning a light-converging point at least within the substrate, ~~neither melting on a laser light incident face of the object nor forming a groove due to melting on the laser light incident face~~, so as to form a substrate modified region including a molten processed region ~~at least~~ only within the substrate, with the ~~molten processed~~ substrate modified region forming a starting point region for cutting the object, the molten processed region being located inside the object by at a predetermined distance from the a laser light incident face of the object; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face and a rear face of the object in order to provide at least one manufactured semiconductor device.

Claim 51 (Currently Amended): A method of manufacturing a semiconductor device formed using a laser processing method, the manufacturing method comprising:

providing a front face of a substrate with a laminate part, the substrate comprising semiconductor material and the laminate part having at least one semiconductor device, the substrate having a starting point region for cutting formed only within the substrate, the starting point region for cutting formed by a substrate modified region formed at a position of a light-converging point in irradiation of laser light; and

cutting the substrate and the laminate part along a line when a fracture generated in a thickness direction of the substrate from the starting point region ~~for cutting~~ reaches a front face of the laminate part and a rear face of the substrate in order to provide at least one manufactured semiconductor device.

Claim 52 (Currently Amended): A method of manufacturing a semiconductor device according to claim 45, wherein the object is irradiated with laser light while positioning a light-converging point within the laminate part, so as to form a laminate part modified region within the laminate part in the irradiating step, and the substrate modified region formed within the substrate and the laminate part modified region formed within the laminate part are separated from each other.

Claim 53 (Canceled).

Claim 54 (Currently Amended): A method of manufacturing a semiconductor device according to claim 48, wherein the object is irradiated with laser light while positioning a light-converging point within the laminate part, so as to form a laminate part modified region within the laminate part in the irradiating step, and the substrate modified region formed within the

substrate and the laminate part modified region formed within the laminate part are separated from each other.

Claim 55 (Currently Amended): A method of manufacturing a semiconductor device according to claim 50, wherein the object is irradiated with laser light while positioning a light-converging point within the laminate part, so as to form a laminate part modified region within the laminate part in the irradiating step, and the substrate modified region formed within the substrate and the laminate part modified region formed within the laminate part are separated from each other.

Claim 56 (Currently Amended): A method of manufacturing a semiconductor device according to claim 51, wherein the object is irradiated with laser light while positioning a light-converging point within the laminate part, so as to form a laminate part modified region within the laminate part in the irradiating step, and the substrate modified region formed within the substrate and the laminate part modified region formed within the laminate part are separated from each other.

Claim 57 (Withdrawn – Currently Amended): The method according to any one of claims 14-2019 and 23-2526, wherein the irradiation of the laser light is performed without making any groove on a laser incident face of the substrate and to make a the substrate modified region and a non-modified region within the substrate and in a laser light incident direction.

Claim 58 (Withdrawn – Currently Amended): The method according to any one of claims 14-2019 and 23-2526, wherein the irradiation of the laser light is performed to make the substrate modified region without intentionally exposing the substrate modified region in at least one of a front and back faces of the substrate into which the laser light enters.

Claim 59 (Withdrawn – Currently Amended): The method according to any one of claims 41-[[49]]46 and 48-50, wherein the irradiation of the laser light is performed without making any groove on a laser incident face of the substrate and to make a the substrate modified region and a non-modified region within the substrate and in a laser light incident direction.

Claim 60 (Withdrawn – Currently Amended): The method according to any one of claims 41-[[49]]46 and 48-50, wherein the irradiation of the laser light is performed to make the substrate modified region without intentionally exposing the modified region in at least one of a front face and a back face of the substrate.

Claim 61 (Withdrawn): The method according to claim 58, wherein the at least one of the front and back face of the substrate is a surface of the substrate into which the laser light enters.

Claim 62 (Withdrawn): The method according to claim 60, wherein the at least one of the front and back face of the substrate is a surface of the substrate into which the laser light enters.